On December 3rd, local agency stakeholders participated in an Analytical Hierarchical Process using the Decision Lens software to rate the relative importance of the 11 project selection criteria included in the Project Selection Model adopted for this study. The purpose of this exercise was to help the study team understand the relative weight or importance each stakeholder places on the 11 criteria used to select projects for evaluation by this study. This memo summarizes the rank ordering of the 11 project selection criteria using a variety of analysis perspectives.

Authorizing Legislation
The overall objectives of this study are outlined in Virginia Code, section 33.1-13.03:1:

Use transportation models and computer simulations to provide an objective, quantitative rating of at least 25 significant transportation projects selected according to priorities determined by the Commonwealth Transportation Board (CTB), in coordination with the Northern Virginia Transportation Authority (NVTA).

- *Evaluate and rate significant highway, rail, bus, and/or technology projects that reduce congestion and improve mobility during homeland security emergency situations.*
- *Priority should be given to projects that most effectively reduce congestion in the most congested corridors and intersections.*

For the purposes of this study, a "project" is defined as one or more complementary investments that attempt to provide a comprehensive solution to an identified congestion problem. A project may include a combination of highway, transit, technology and/or travel demand management improvements and any access components such as pedestrian, bicycle and parking improvements which enhance the project's effectiveness in reducing congestion.

Multi-modal projects are encouraged and welcomed. For example:

- HOV/HOT lanes with high quality bus service and connections to park-&-ride lots with multimodal access options;
- A Metrorail extension with enhanced feeder bus, multimodal station access, street improvements, and demand management incentives; or
- A series of roadway improvements to address bottlenecks with an active traffic management system to coordinate signals and provide routing information to travelers.

Project Selection Model
The Project Selection Model (PSM) provides an objective and quantitative process by which to determine (1) the degree of significance of each nominated project and (2) the degree to which the

nominated project is likely to reduce congestion, while also improving mobility during a homeland security emergency.

The PSM was developed based on the study objectives and the input from the representatives of the Northern Virginia jurisdictions and transit agencies. The PSM includes two assessment tiers. The first tier satisfies the requirement that the project is consistent with CTB priorities. The second tier utilizes eleven selection criteria to determine the degree of significance of the project, and the degree to which the project has the potential to reduce congestion and improve mobility.

The eleven criteria in Tier two of the PSM can be grouped into three categories – (1) Project Significance; (2) Congestion Reduction Potential and (3) Homeland Security Mobility: Five under category one associated with the significance of the nominated project; five under category two that are specific to assessing the project's potential to reduce congestion; and one under category three that addresses the project's potential to improve mobility during a homeland security emergency. A description of each criterion is provided below. Several of the criteria are based on attributes of the proposed project, while other criteria are based on the travel conditions in the year 2020 the project is designed to address.

Tier Two Criteria

Category 1: Project Significance

1. **Project Type**

   The project includes a highway, rail, bus, technology or large scale travel demand management investment.

2. **Designated Corridors**

   The project is on a facility in/near Northern Virginia and included in the Statewide Mobility System, Corridors of Statewide Significance, in a Super NoVA corridor or in a TransAction 2040 corridor.

3. **High Travel Volume**

   The project is in a corridor that serves a high volume of person trips.

4. **Connects Regional Activity Centers (RACs)**

   The project enhances or expands transit, HOV/HOT or roadway connections between non-contiguous regional activity centers (RACs).

5. **Connects Major Facilities**

   The project enhances or completes connections between interstate highways, principal arterials or transit stations, park-&-ride lots and DCA or IAD airports.

Category 2: Congestion Reduction Potential

6. **Congestion Severity**

   The project is located in a heavily congested corridor.

7. **Congestion Duration**

The project corridor experiences moderate to heavy congestion for multiple hours of the day.

8. **Person Hours of Delay**

   The project is located in a corridor with significant person hours of delay.

9. **Adds Capacity**

   The project adds person moving capacity to a congested location, facility or corridor.

10. **Reduces Vehicle Trips**

    The project has the potential to reduce vehicle trips on a congested facility or corridor.

Category 3: **Homeland Security Mobility**

11. **- Facility and Operational Improvements**

    The project improves regional mobility in the event of a homeland security emergency.

Participants from Northern Virginia Transportation Agencies

The jurisdictions and agencies that participated in the PSM ranking workshop are listed below[1].

Counties	Cities and Towns	Transit Agencies
Fairfax County	City of Manassas	WMATA
Prince William County	City of Fairfax	VRE
Loudoun County	City of Manassas Park	PRTC
Arlington County	City of Falls Church	NVTC
City of Alexandria	Town of Leesburg	
	Town of Herndon	
	Town of Dumfries	

As part of the workshop, each jurisdiction or agency was provided with one voting machine to register their opinion about the relative importance of each criterion. Each participant entered a value between one and nine to indicate how much more important one criterion was relative to other criteria within the category. A total of 23 votes were taken to estimate the relative importance of each criterion. At the end of the process, the participants were shown a summary of the collective raw votes.

Ranking of Project Selection Criteria

In order to fairly represent the relative importance the region places on the criteria to be used to select projects for evaluation by this study, three weighting schemes were applied to the stakeholder participant votes. The first is equal weights for each participant (the votes as recorded during the Dec. 3, 2013 PSM Input session). The second is to factor the vote of each participant by the population of the jurisdiction or the ridership served by the transit agency the participant represents. The third method was to approximate the NVTA voting process as closely as possible. The NVTA Voting rules focus on the representatives of the four Counties and the five Cities in Northern Virginia. This approach gives equal weight to the four Counties

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[1] Representatives from the Towns of Vienna and Purcellville were provided with the PSM documents and invited to the workshop but were unable to attend.

and the five Cities in Northern Virginia and zero weight to the seven town and transit agency representatives who participated in the exercise.

Method Comparisons

Table 1 shows a comparison of the three project selection weighting methods viewed side-by-side. The table shows the ranking of the three categories of criteria (project significance, congestion reduction, homeland security mobility) and the ranking of each attribute within these three categories. The table also lists, under each method, the importance of each attribute as a part of the overall set of 11 criteria.

Table 1: Weighting Method Comparison

Category-Attribute	Equal Weights			Population/Ridership Weights			NVTA Voting Weights		
	Category	Attribute	Overall	Category	Attribute	Overall	Category	Attribute	Overall
Project Significance	39.7%			54.7%			56.3%		
Project Type		8.1%	3.2%		5.1%	2.8%		6.1%	3.5%
Designated Corridors		20.9%	8.3%		24.2%	13.2%		22.5%	12.7%
High Travel Volume		27.8%	11.0%		27.6%	15.1%		27.1%	15.2%
Connects RACs		27.5%	10.9%		30.8%	16.8%		27.9%	15.7%
Connects Major Facilities		15.7%	6.2%		12.4%	6.8%		16.4%	9.2%
		100.0%	39.7%		100.0%	54.7%		100.0%	56.3%
Congestion Reduction Potential	49.3%			37.8%			35.2%		
Congestion Severity		18.8%	9.3%		18.7%	7.1%		12.5%	4.4%
Congestion Duration		24.3%	12.0%		30.3%	11.4%		20.1%	7.1%
Person Hours of Delay		21.7%	10.7%		22.0%	8.3%		22.2%	7.8%
Adds Capacity		19.7%	9.7%		20.4%	7.7%		28.4%	10.0%
Reduces Vehicle Trips		15.5%	7.6%		8.6%	3.3%		16.8%	5.9%
		100.0%	49.3%		100.0%	37.8%		100.0%	35.2%
Homeland Security Mobility	11.0%			7.5%			8.5%		
Facility Improvements		100.0%	11.0%		100.0%	7.5%		100.0%	8.5%
Total	100.0%			100.0%			100.0%		

Criteria Category:

Looking first at the relative importance of the three criteria groups - project significance, congestion reduction, homeland security mobility - the Equal Weight method gives preference to projects with Congestion Reduction Potential while the Population/Ridership and NVTA Voting methods both emphasize Project Significance. There is no change in the order of preference for the Homeland Security Mobility criteria among the three methods.

Attributes Within Each Criteria Category:

Next, a closer examination of the five attributes of Project Significance shows all three methods have nearly the same distribution of preferences among the Project Significance attributes. The order of priority is:

1. *Connects Regional Activity Centers*
2. *High Travel Volume*
3. *Designated Corridors*
4. *Connects Major Facilities*
5. *Project Type*

Looking at the <u>overall weights</u>, the Population/Ridership and NVTA Voting methods have the same top three preferences in the same order:

1. *Connects Regional Activity Centers*
2. *High Travel Volume*
3. *Designated Corridors*

A closer examination of the five attributes of Congestion Reduction Potential shows that the three methods do not have the same distribution of preferences, however, all three methods result in the same top three attributes: *Congestion Duration, Person Hours of Delay* and *Adds Capacity.*

Again looking at the <u>overall weights</u>, the top three preferences in the Equal Weight method are:

1. *Congestion Duration*
2. *High Travel Volume*
3. *Homeland Security Mobility*

There is only one attribute within the Homeland Security Mobility criteria and there is no substantive change in the preference for the attribute among the three methods.

Conclusions and Recommendations

Since the existing regional (TPB and NVTA) decision-making process uses a weighting scheme that favors larger jurisdictions, it does not seem appropriate to adopt the equal-weights approach for this study. The similarities between the Population/Ridership and NVTA Voting methods suggest that either of these two methods should be acceptable to both the NVTA and the CTB. They both assign similar order of preference to the three criteria categories: Project Significance, followed by Congestion Reduction Potential and then Homeland Security Mobility. These two methods also assign the same order of distribution for all five attributes within the Project Significance criteria. Finally, while these two methods do have a different order of distribution of the five attributes within the Congestion Reduction Potential criteria, the top three attributes are the same under both methods.

Given these similarities, the VDOT study team believes averaging the Population/Ridership weights with the NVTA Voting weights provides the best overall choice. This model considers the input of every participant with no exclusions and gives preference to the values of larger jurisdictions consistent with the NVTA's Bylaws and voting rules. The blended approach also provides explicit and proportional consideration of the input from the transit agencies. Finally, the overall order and magnitude of the 11 criteria as provided by the Population/Ridership method is not substantively different from that provided by the NVTA Voting method and appears to be consistent with both the NVTA and the CTB outlooks. The recommended criteria weights are shown below.

Table 2: Recommended Project Selection Model Weights

Category	Attribute	Category Weights	Attribute Weights	Overall Weights
Project Significance		55.5%		
	Project Type		5.6%	3.1%
	Designated Corridors		23.3%	12.9%
	High Travel Volume		27.3%	15.2%
	Connects Regional Activity Centers		29.3%	16.3%
	Connects Major Facilities		14.4%	8.0%
			100.0%	55.5%
Congestion Reduction Potential		36.5%		
	Congestion Severity		15.6%	5.7%
	Congestion Duration		25.2%	9.3%
	Person Hours of Delay		22.1%	8.1%
	Adds Capacity		24.4%	8.9%
	Reduces Vehicle Trips		12.7%	4.6%
			100.0%	36.5%
Homeland Security Mobility		8.0%		
	Facility and Operational Improvements		100.0%	8.0%
Total		100.0%		